March 4, 1930. E. W. CHALLANS 1,748,944

ELECTROMECHANICAL DEVICE OF THE INDUCTION TYPE

Filed Nov. 22, 1928

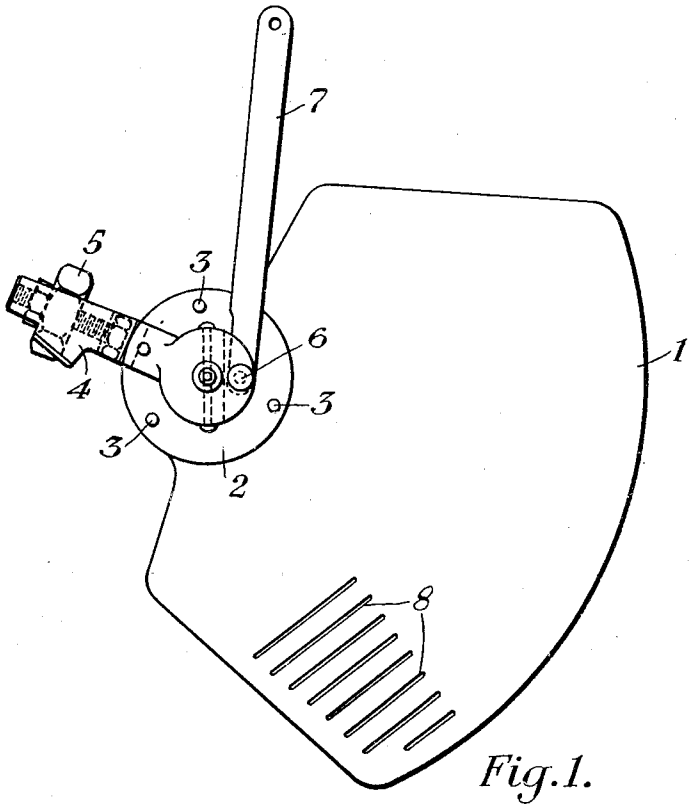

Fig. 1.

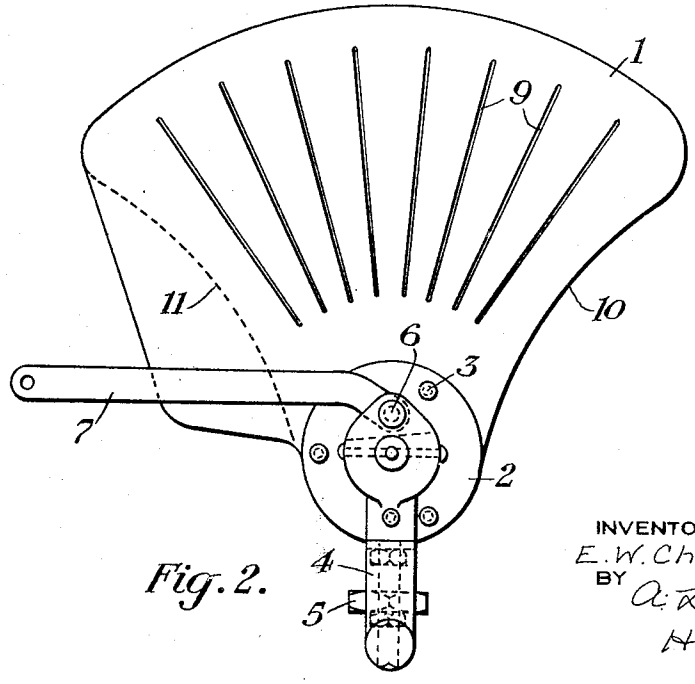

Fig. 2.

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UNITED STATES PATENT OFFICE

ERIC WILLIAM CHALLANS, OF KING'S CROSS, LONDON, ENGLAND, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

ELECTROMECHANICAL DEVICE OF THE INDUCTION TYPE

Application filed November 22, 1928, Serial No. 321,065, and in Great Britain November 29, 1927.

My invention relates to electro-mechanical devices of the induction type, such, for instance, as alternating current relays in which the actuation of the movable element of the device when the latter is energized, is effected by eddy currents induced in the movable element under the action of alternating magnetic fields.

As usually constructed, the torque exerted upon the vane or other movable element of a device of this character is dependent upon the energizing current supplied to the windings of the device being substantially uniform throughout the range of movement of the vane or element. This characteristic, although valuable in certain applications is disadvantageous in others; in particular, in the case of an alternating electric current relay, the variation in the torque exerted on the vane due to variation in the voltage impressed upon the relay windings, tends to cause a corresponding variation in the pressure exerted between the relay contacts when the relay is energized. This contact pressure may thus be different in the case of relays differently situated relative to the source of energizing current and may thus prevent a number of relays in a railway signaling system, for instance, from being operated in a uniform and constant manner regardless of voltage variations as is evidently desirable.

According to the present invention the torque causing a movement of the movable element of the device is when the element reaches a predetermined position arranged to have an upper limiting value by increasing the resistance of the path of the eddy currents in the movable element or by varying the form of this path beyond this position.

In particular, the torque exerted upon the vane or other movable element of an alternating current relay, is arranged to be greatly decreased in this manner when the vane passes a predetermined position in its range of movement so that in practice, the vane will not be carried beyond this position which is arranged to be the position at which the required pressure is exerted between the relay contacts. The contact pressure exerted is thus not appreciably increased when the voltage impressed upon the relay is considerably higher than the normal voltage, owing to the fact that, as above explained, the torque exerted upon the vane for any impressed voltage within a considerable range is so reduced when the vane passes the predetermined position that this position is substantially the limit of the travel of the vane under all conditions.

The invention is illustrated by way of example in the accompanying drawings of which Fig. 1 is a view in front elevation of a vane for an alternating current relay constructed in accordance with one form of the invention, Fig. 2 being a similar view showing an alternative construction.

Referring now first to the form shown in Fig. 1, it will be seen that the vane comprises a thin sheet of aluminum 1 secured to a central boss or collar 2 by means of rivets 3 in the usual manner, the boss or collar 2 being provided with a projecting arm 4 carrying an adjustable counterweight 5. The boss or collar 2 is also pivotally connected as indicated at 6 to the lower end of a link 7, the upper end of which is connected to the relay contact mechanism not shown.

It will be understood that the vane is so pivotally mounted in the relay as to be rotated in a counter-clockwise direction under the action of the eddy currents induced in the vane by the electromagnetic system of the relay. The lower corner of the vane 1 is provided with a number of parallel slots 8 extending in a direction at right angles to the path of the eddy currents in the vane when the latter has moved to the desired limiting position and it will be understood that in this position the slots 8 cause a relatively considerable increase in the resistance of the path of the eddy current owing to the electric discontinuity of this part of the vane owing to the presence of the slots 8.

As a result the vane 1 will not be carried beyond its limiting position regardless of the voltage impressed upon the energizing windings of the relay and the contact pressure on the relay contacts is thus maintained substantially constant under all conditions.

It will be evident that the electrical re-

sistance of the portion of the vane occupied by the slots 8 in the construction shown in Fig. 1 may be increased in other ways as, for instance, by reducing the thickness of the vane at this portion thereof or by forming this portion of the vane 1 of a material having a lower electrical conductivity than the remainder of the vane.

In the modified construction shown in Fig. 2, the vane 1 is shown as provided with the usual radial slots 9 for defining the path of the eddy currents producing the torque.

In order to ensure a limiting value for the movement of the vane in accordance with the invention the right hand portion thereof is shaped or cut away as indicated at 10 so as to increase the resistance of the eddy current path or to alter the form of this path when the vane 1 reaches its limiting position.

In the case of a three-position relay in which the vane 1 is adapted to move from its normal or de-energized vertical position shown in Fig. 2 in both directions, a substantially constant limiting position for each direction of movement may be ensured by forming or cutting away the other side of the vane as indicated by dotted lines at 11 in a similar manner to that indicated at 10 on the other side of the vane.

The invention is evidently not limited to the particular constructions above described and illustrated which may be varied in many respects without exceeding the scope of the invention.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

An electro-mechanical device of the induction type involving a metallic vane which is provided with slots extending substantially at right angles to the path of the eddy currents and which slots are so located as to produce an upper limiting value to the torque causing the movement of the vane when the vane reaches a predetermined position.

In testimony whereof I affix my signature.

ERIC WILLIAM CHALLANS.